

# ENGINE ASSEMBLY (2ZZ-GE)

140R4-01

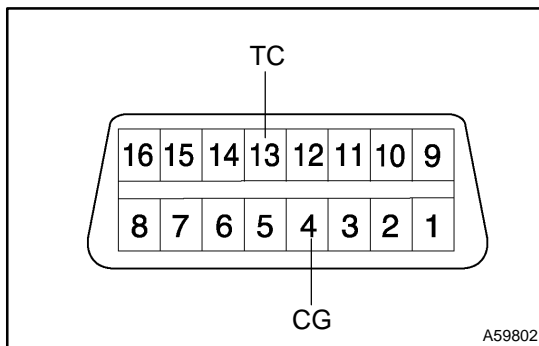
## INSPECTION

1. INSPECT COOLANT (See page 16-6)
2. INSPECT ENGINE OIL(See page 17-12)
3. INSPECT BATTERY(See page 19-12)
4. INSPECT AIR CLEANER FILTER ELEMENT SUB-ASSY
5. INSPECT SPARK PLUG(See page 18-5)
6. **INSPECT IGNITION TIMING**
  - (a) Warm up engine.
  - (b) When using hand-held tester or OBDII scan tool.
    - (1) Connect the hand-held tester or OBDII scan tool to the DLC3.

### HINT:

Please refer to the hand-held tester or OBDII scan tool operator's manual for further details.

- (c) When not using hand-held tester or OBDII scan tool.

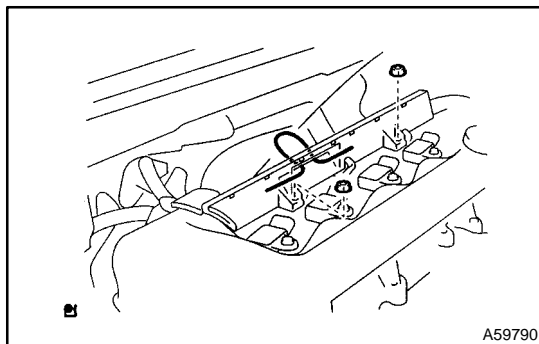


- (1) Using SST,connect terminals 13 (TC) and 4 (CG) of DLC3.

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### NOTICE:

- **Be sure not to connect incorrectly. It causes breakage of the engine.**
- **Turn OFF all electrical systems.**
- **Operate the inspection when the cooling fan motor is turned OFF.**



- (2) Remove the 3 bolts, the nut and the cylinder head cover No. 2.
- (3) Pull out the wire harness as shown in the illustration.
- (4) Connect timing light to engine.

### NOTICE:

- **Use a timing light which can detect the first signal.**
- **After checking, be sure to tape the wire harness.**

- (5) Inspect ignition timing at idle.

**Ignition timing: 8 – 12° BTDC**

### NOTICE:

**When checking the ignition timing, the transmission is at neutral position.**

### HINT:

After engine rpm is kept at 1,000 – 1,300 rpm for 5 seconds, check that it returns idle speed.

- (6) Disconnect the terminal 13 (TC) and 4 (CG) of the DLC3.

(7) Inspect ignition timing at idle.

**Ignition timing:**

**M/T 4 – 12° BTDC**

**A/T 10 – 18° BTDC**

(8) Confirm that ignition timing moves to advanced angle side when the engine rpm is increased.

(9) Remove the timing light.

(10) Install cylinder head cover No. 2 with the 3 bolts and the nut.

**Torque: 7.0 N·m (71 kgf·cm, 62 in.-lbf)**

## 7. INSPECT ENGINE IDLE SPEED

(a) Warm up engine.

(b) When using hand-held tester or OBDII scan tool.

(1) Connect the hand-held tester or OBDII scan tool to the DLC3.

**HINT:**

Please refer to the hand – held tester or OBDII scan tool operator's manual for further details.

(c) Check the idle speed.

**Idle speed:**

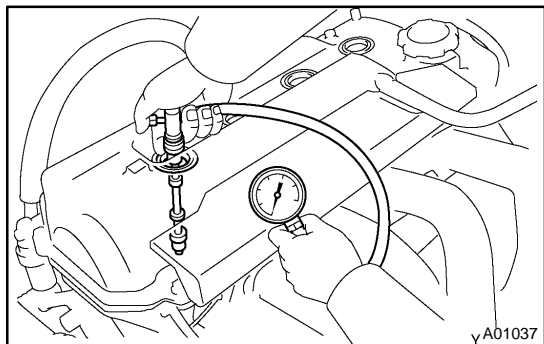
**M/T 750 – 850 rpm**

**A/T 700 – 800 rpm**

**NOTICE:**

- **Check idle speed with cooling fan OFF.**
- **Switch off all accessories and air conditioning.**

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## 8. INSPECT COMPRESSION

(a) Warm up and stop engine.

(b) Remove ignition coil.

(c) Remove spark plugs.

(d) Inspect cylinder compression pressure.

SST 09992-00500

(1) Insert a compression gauge into the spark plug hole.

(2) Fully open the throttle.

(3) While cranking the engine, measure the compression pressure.

**NOTICE:**

- **Always use a fully charged battery to obtain engine speed of 250 rpm or more.**
- **Check other cylinder's compression pressure in the same way.**
- **This measurement must be done in as short a time as possible.**

**Compression pressure:**

**1,400 kpa (14.3 kgf/cm<sup>2</sup>, 203 psi)**

**Minimum pressure:**

**1,000 kpa (10.3 kgf/cm<sup>2</sup>, 145 psi)**

**Difference between each cylinder:**

**110 kpa (1.1 kgf/cm<sup>2</sup>, 16 psi)**

- (4) If the cylinder compression in one more cylinders is low, pour a small amount of engine oil into the cylinder through the spark plug hole and repeat steps (1) through (3) for cylinders with low compression.
  - If adding oil helps the compression, it is likely that the piston rings and/or cylinder bore are worn or damaged.
  - If pressure stays low, a valve may be sticking or seating is improper, or there may be leakage past the gasket.

**9. INSPECT CO/HC**

- (a) Start engine.
- (b) Race engine at 2,500 rpm for approx. 180 seconds.
- (c) Insert CO/HC meter testing probe at least 40 cm (1.3 ft) into tailpipe during idling.
- (d) Immediately check CO/HC concentration at idle and/or 2,500 rpm.

**HINT:**

- Complete the measuring within 3 minutes.
- When doing the 2 mode (idle and 2,500 rpm) test, these measuring orders are prescribed by the applicable local regulations.
- (e) If the CO/HC concentration does not comply with regulations, troubleshoot in the order given below.
  - (1) Check heated oxygen sensor operation.(See page 12-13)

CO	HC	Problems	Causes
Normal	High	Rough idle	1. Faulty ignitions: <ul style="list-style-type: none"> <li>• Incorrect timing</li> <li>• Fouled, shorted or improperly gapped plugs</li> </ul> 2. Incorrect valve clearance 3. Leaky intake and exhaust valves 4. Leaky cylinders
Low	High	Rough idle (Fluctuating HC reading)	1. Vacuum leaks: <ul style="list-style-type: none"> <li>• PCV hoses</li> <li>• Intake manifold</li> <li>• Throttle body</li> <li>• ISC valve</li> <li>• Brake booster line</li> </ul> 2. Lean mixture causing misfire
High	High	Rough idle (Black smoke form exhaust)	1. Restricted air filter 2. Plugged PCV valve 3. Faulty EFI systems: <ul style="list-style-type: none"> <li>• Faulty pressure regulator</li> <li>• Defective water temperature sensor</li> <li>• DEFECTIVE Air-flow meter</li> <li>• Faulty ECM</li> <li>• Faulty injectors</li> <li>• Faulty throttle position sensor</li> </ul>